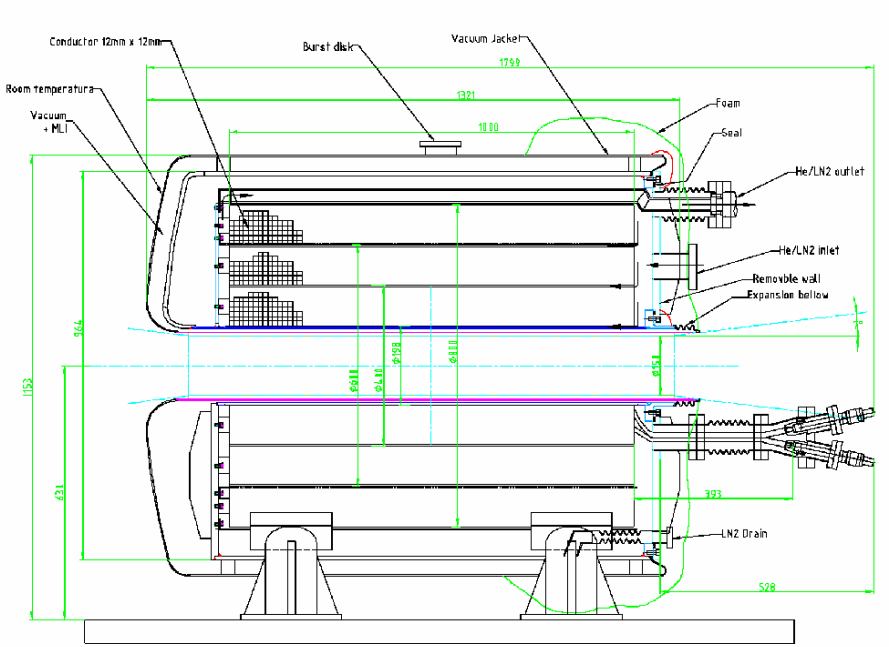
Pulsed Solenoid Update

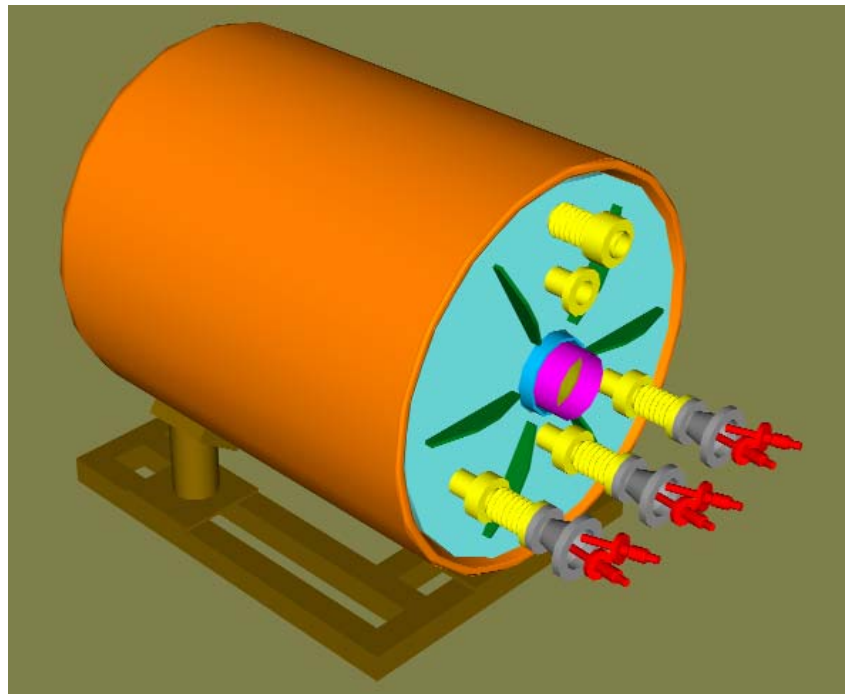
Technical Board Phone Meeting

October 17, 2003

Harold G. Kirk
Brookhaven National Laboratory

High Field Pulsed Solenoid





- 70^{o} K Operation
- 15 T with 4.5 MW Pulsed Power
- 15 cm warm bore
- 1 m long beam pipe

Peter Titus, MIT

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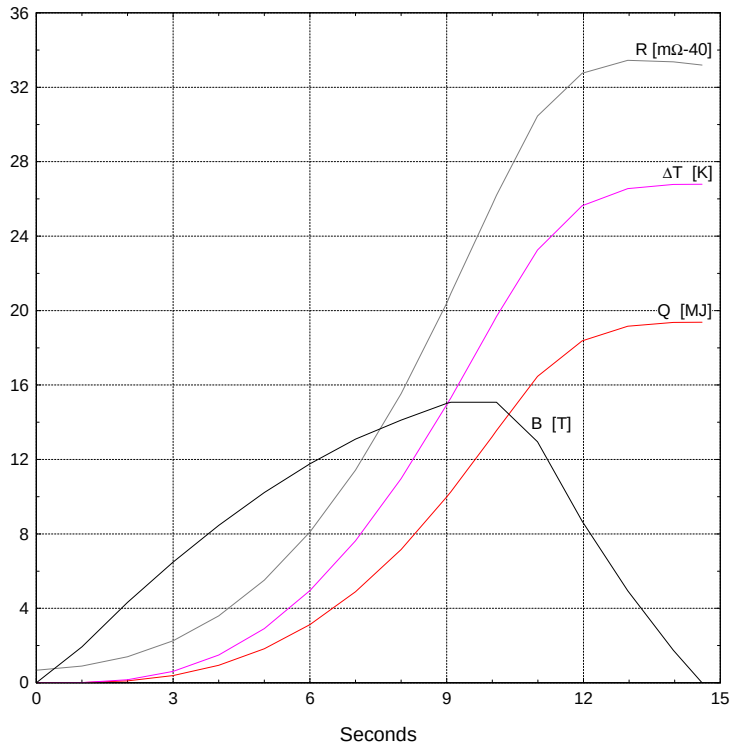
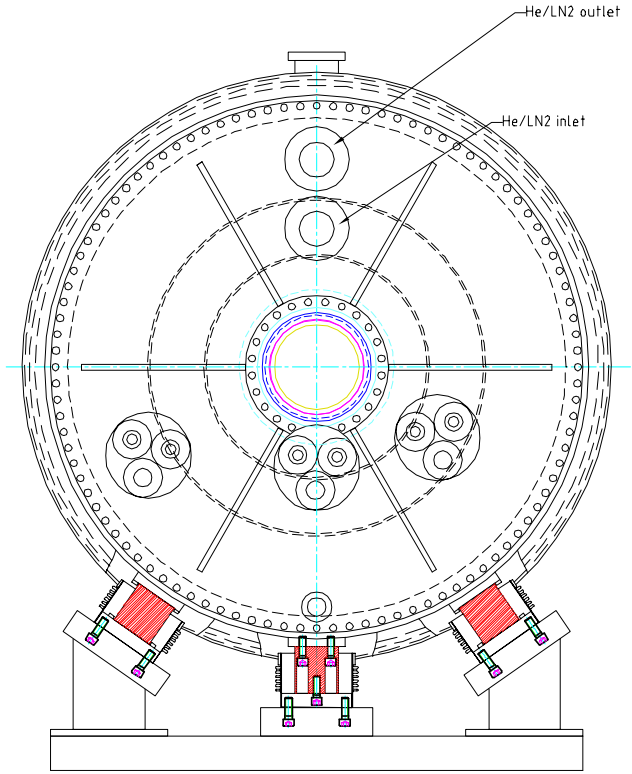
Pulsed Solenoid Performance

Pulse Coil Cooled to 70 K and Charged to 7200 A at 600 V, then -600 V





- 5T Peak Field with 2 inner coils; 540 KVA ; 80^{O} K
- 10T Peak Field with 2 inner coils; 2.2 MVA PS; 72^{O} K
- 15T Peak Field with 3 coils; 2.2 MVA PS; 30^{O} K
- 15T Peak Field with 3 coils; 4.4 MVA PS; 70^{O} K

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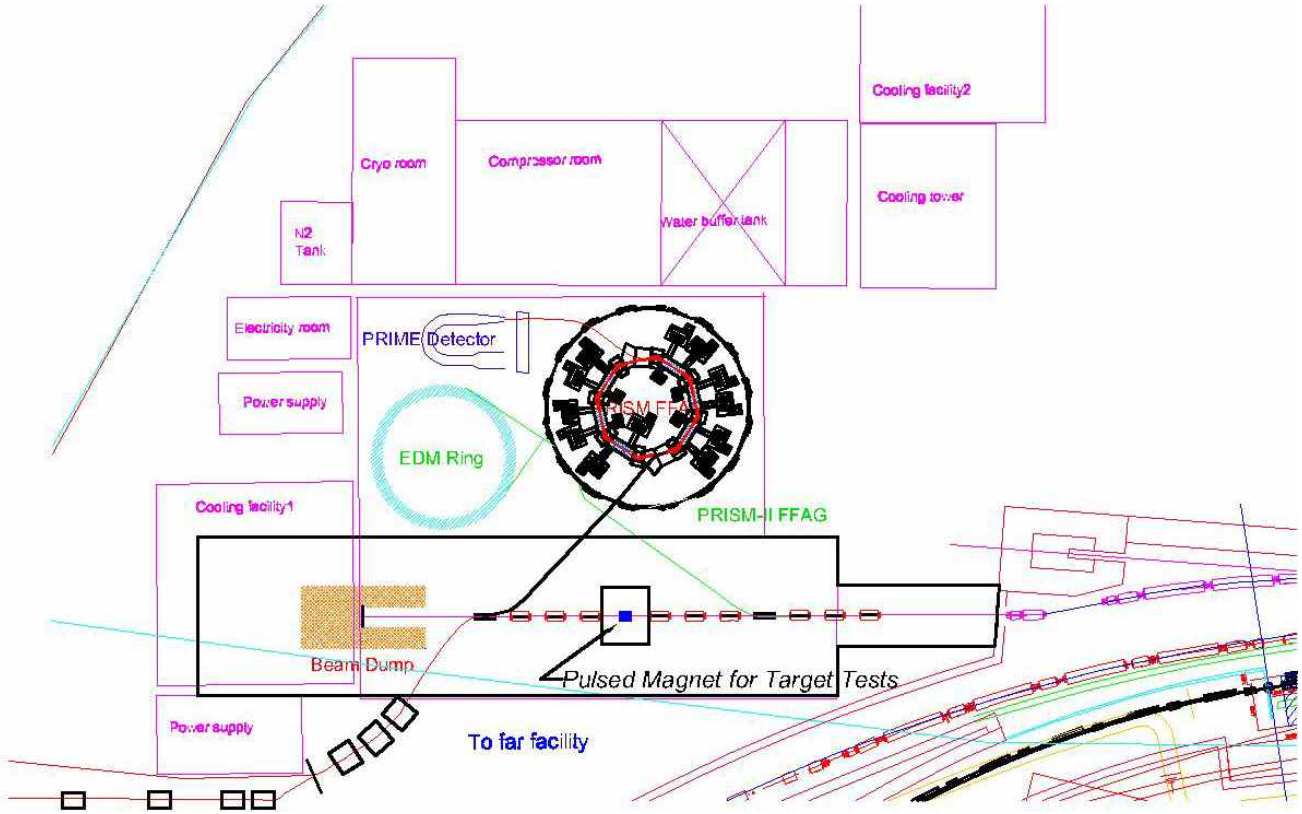
Possible Target Test Station Sites

Accelerator Complex Parameters:

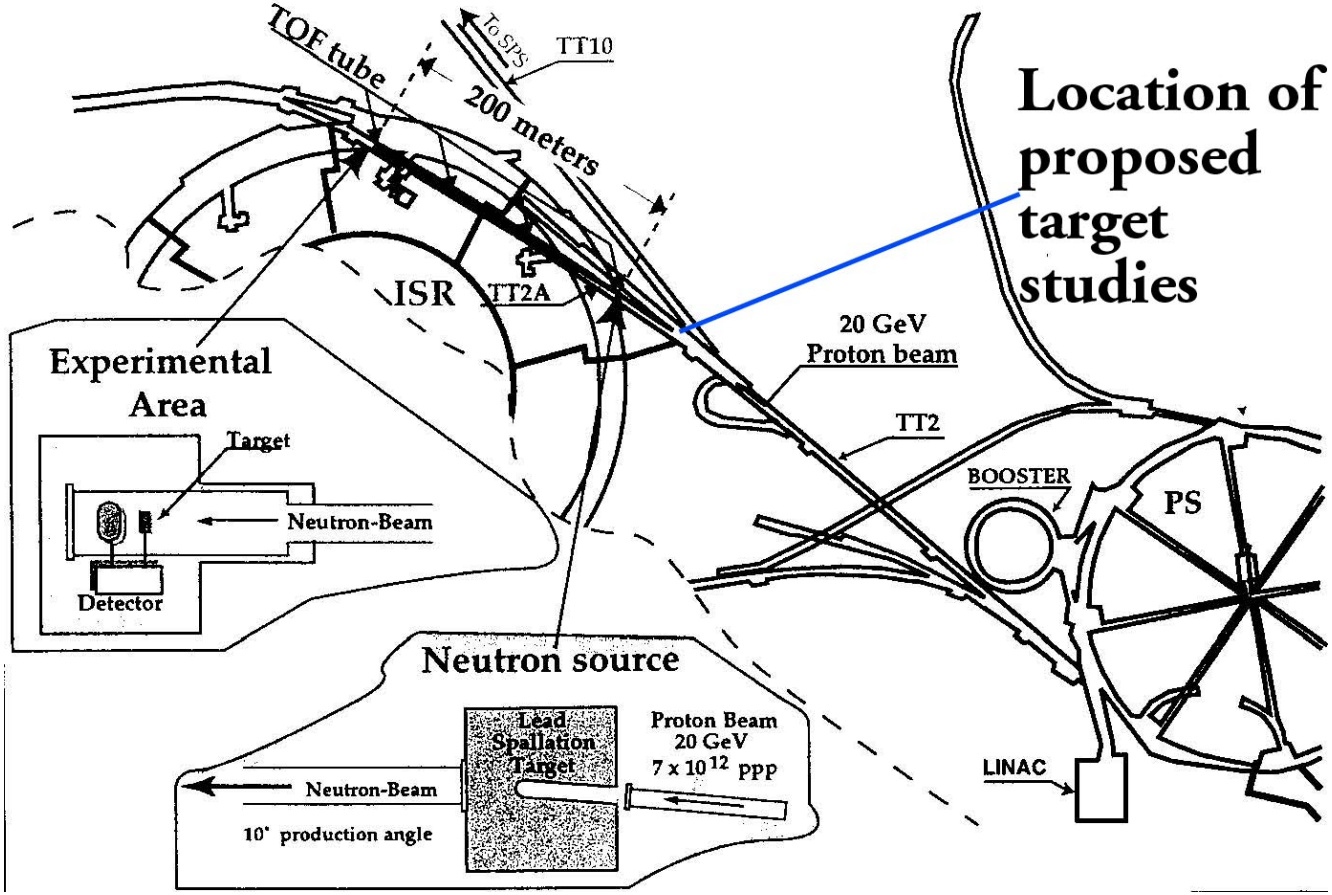
Parameter	BNL AGS	CERN PS	RAL ISIS	LANCE WNR	JPARC RCS	JPARC MR
Proton Energy, GeV	24	24	0.8	0.8	3	50
p/bunch, 10^{12}	6	4	10	28	42	42
Bunch/cycle	12	8	2	1	2	9
p/cycle, 10^{12}	72	32	20	28	83	300
Cycle length, μs	2.2	2.0	0.3	0.25	0.6	4.2
Availability (?)	07	06	06	Now	08	09

Possible Targetry Test at JPARC

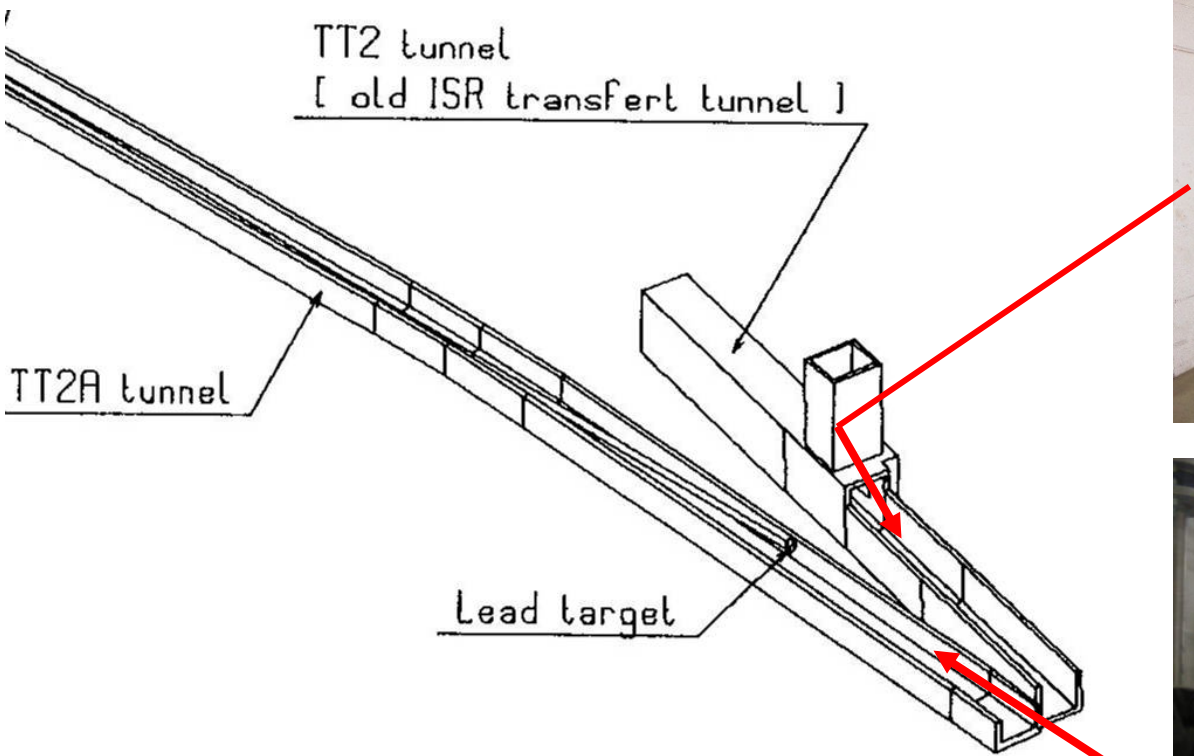


Letter of Intent submitted January 21, 2003 – presented June 27, 2003

Target Test Site at CERN



Possible Experiment Location at CERN



Letter of Intent to be submitted Oct. 25, 2003

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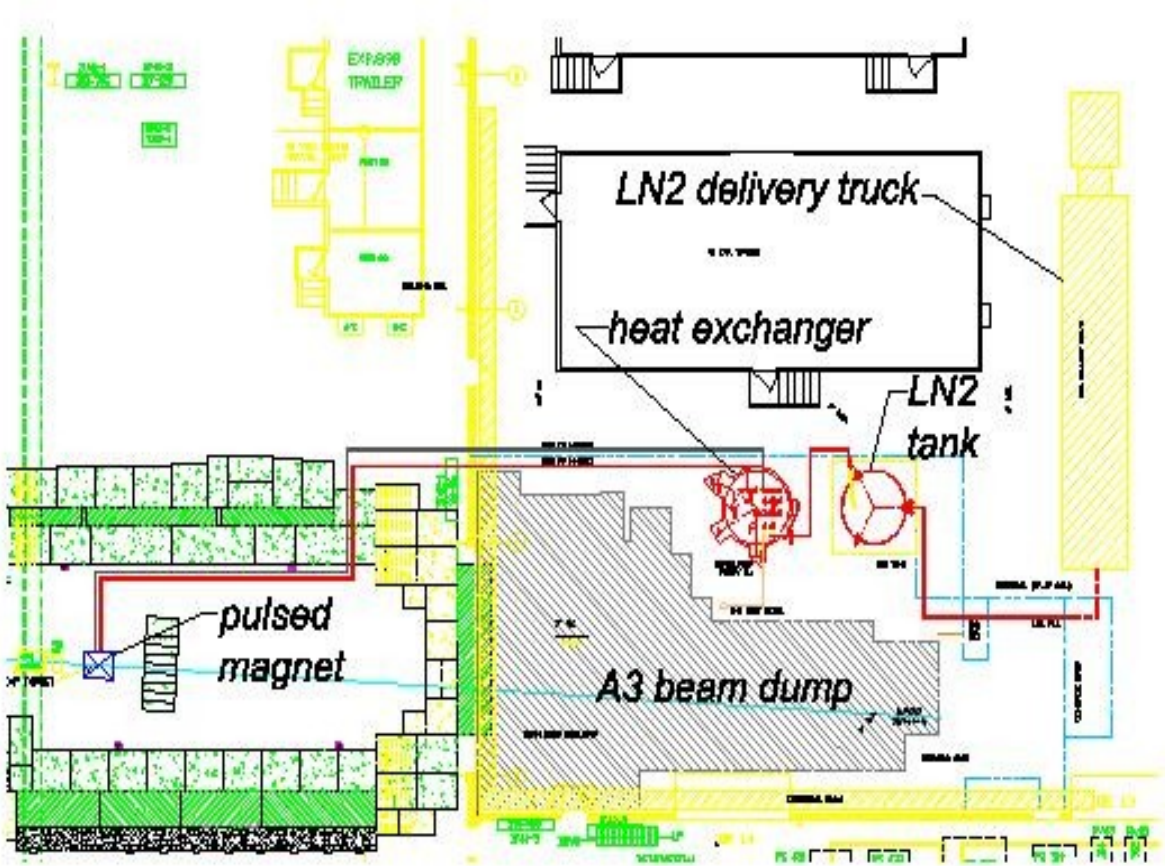
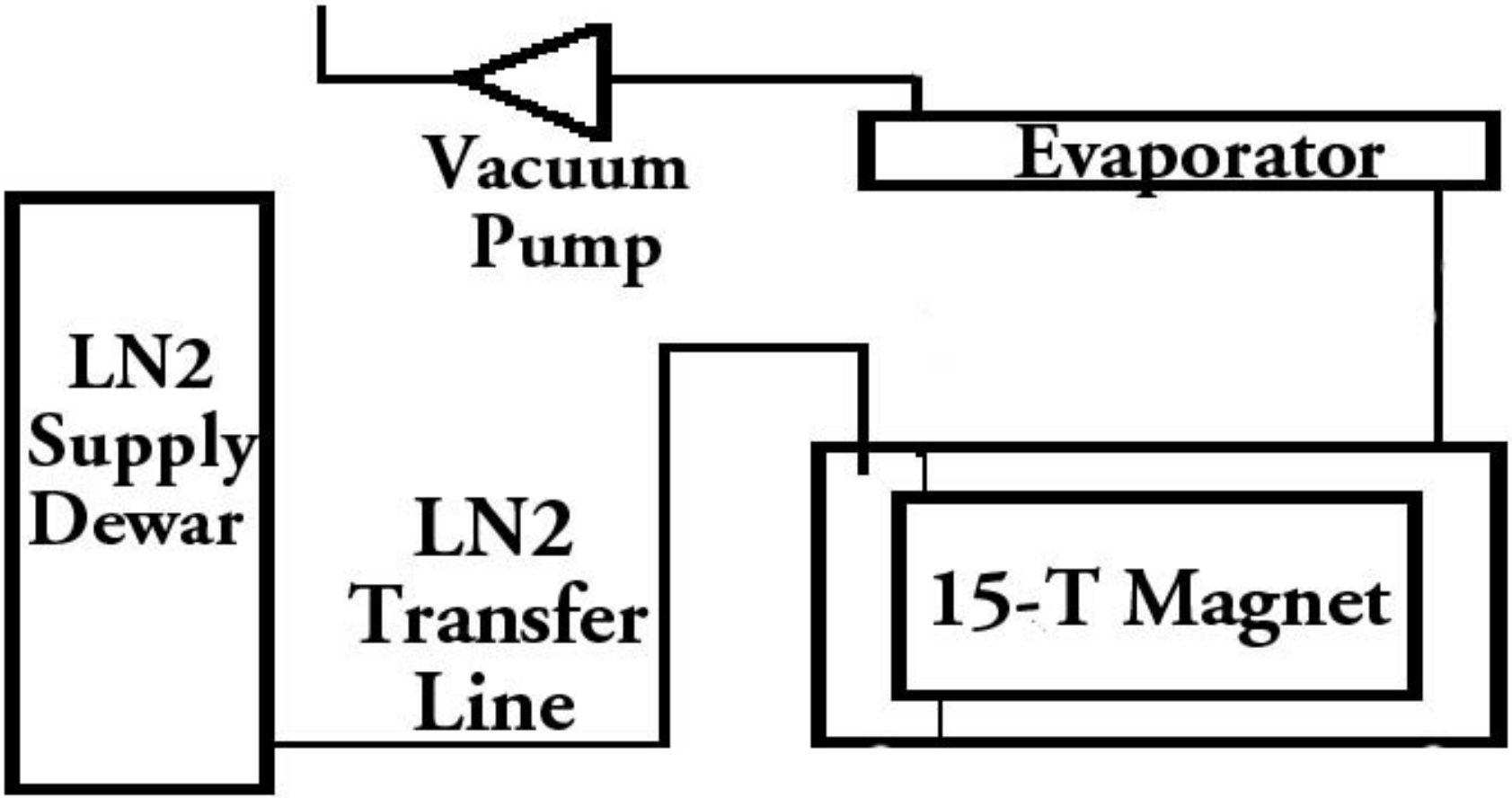
Original Cryogenic Concept at BNL

- BNL specific solution
- Heat exchanger
- LH_2 or LN_2 primary cooling
- Circulating gaseous He secondary cooling



Simplified Cryogenic System

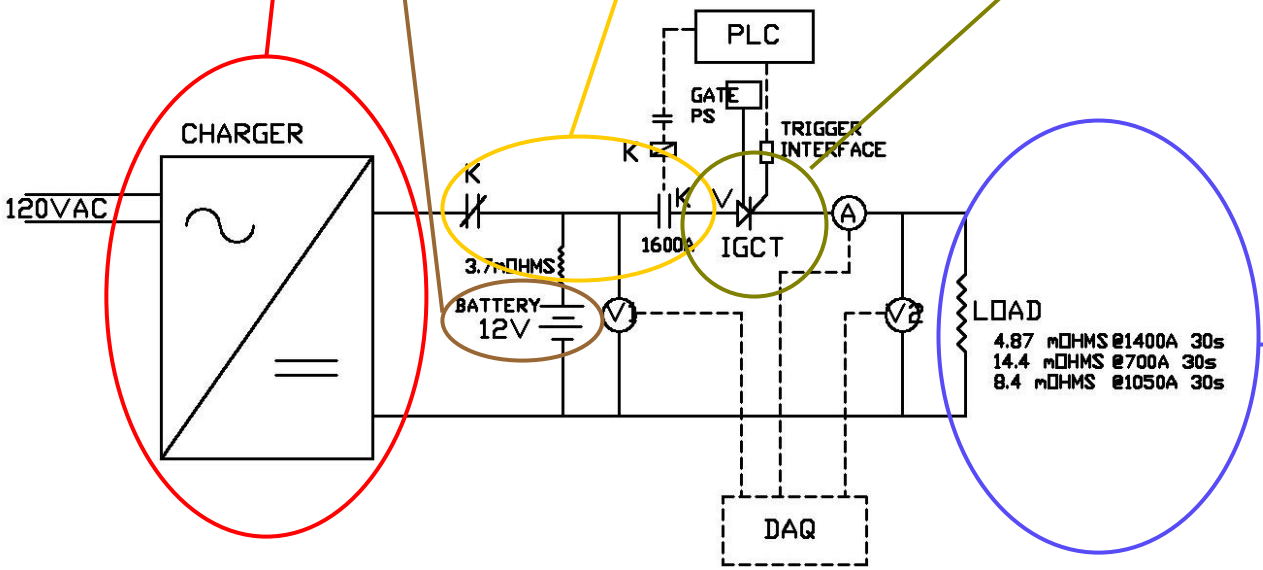


Battery Power Supply R&D

Battery/Charger
12V 1400A

Mech. Switch
1500V 1600 A

IGCT 600V 4000A



Load

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Battery Power Supply (Cont)

Mechanical Switch capable
of 4.4 MW Pulsed System

Pulsed Solenoid Project Cost Profile

Magnet

Fabrication	$ 410 K
Monitoring	$ 80 K
Testing	$ 90 K
Shipping	$ 15 K

Cryogenic System (LN_2 without Heat Exchanger)

Cryo	$ 300 K

PS (Battery array with switching/charging/bussing)

PS System	$ 460 K

Total Project Cost $1355 K

Pulsed Solenoid Cash Flow Profile

	Cost	Annual Budget	Accumulated Cost
FY03			
Magnet Fabrication	385	385	385
FY04			
Magnet Fabrication	25		
Magnet Monitoring	80		
Battery Development	85	190	575
FY 05			
Magnet Testing	90		
Magnet Shipping	15		
Battery PS	200		
Cryo System	115	420	995
FY06			
Battery PS	175		
Cryo System	185	360	1355

Additional FY05 and FY06 Items

BNL

Simulations	50 K
Material Studies	50 K

Princeton

Hg Jet Development	30 K
Jet Diagnostics	30 K